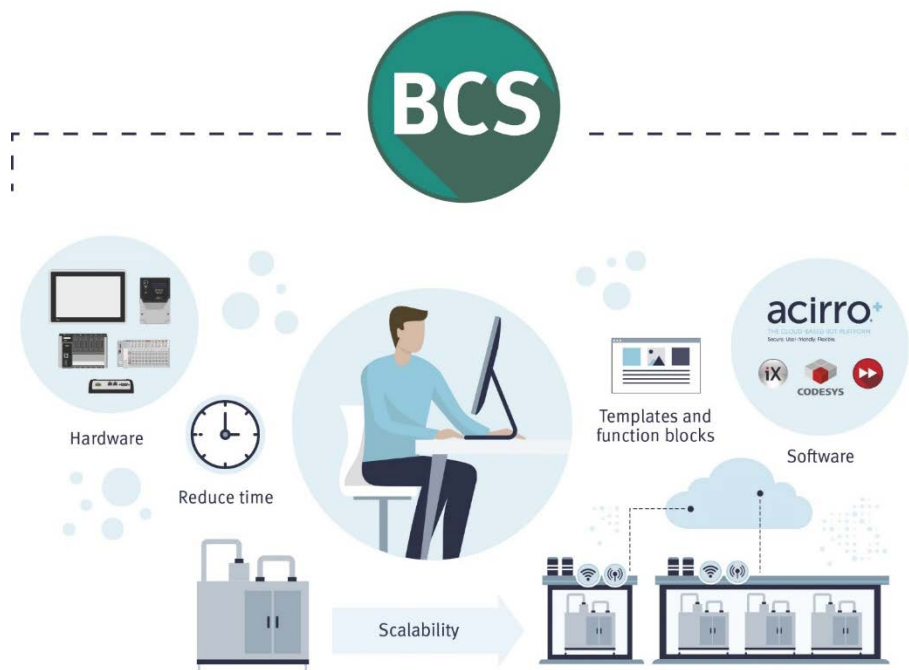


Quick start guide

Fast logging FB - CODESYS library

SER0002 - Achieve logging to USB, SD or locally with your X2 Control



1 Function and area of use

This document explains the CODESYS library for fast logging.

Target device: X2 / BoX2 control series, with embedded CODESYS runtime.

2 About this document

This quick start document should not be considered as a complete manual. It is an aid to be able to startup a normal application quickly and easily.

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Use the following hardware, software, drivers and utilities in order to obtain a stable application:

In this document we have used following software and hardware

- BCS Tools 3.34 or CODESYS 3.5 SP13 patch 3
- X2 control and BoX2 control devices

For further information refer to

- CODESYS online help
- Installation manual X2 control (MAxx202)
- [Beijer Electronics knowledge database, HelpOnline](#)

This document and other quick start documents can be obtained from our homepage.

Please use the address support.europe@beijerelectronics.com for feedback.

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4 Datalogging with CODESYS function blocks

This library is compatible with X2 Control and BoX2 Control devices (DeviceId 0x1024)

This library simplifies the solution to achieve 1ms logging.

Upto 10 REALs can be logged at a rate as low as 1ms. The library creates a CSV file that can be written to USB, SD or locally (to the FTP area of the X2).

Note!

Recommendation to use SD card instead of the built-in flash memory when extensive data logging is performed. Read more about the X2 and iX Developer 2.40 - Flash memory best practice: [click here](#)

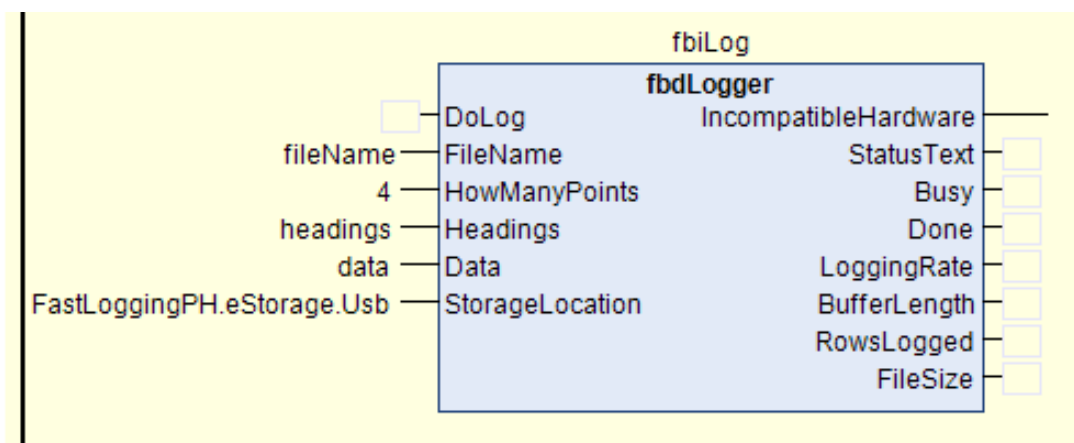
"...iX Developer 2.40 SP5 introduces the capability to use external SDcard on X2 devices with SD card support. An SD card is easy to replace compared to a built-in memory. Beijer Electronics AB recommends you to use SD card instead of the built-in flash memory when extensive data logging is performed. Scripting towards the database can cause an increase in write and affect the general sustainability and performance of the database..."

The filename is dynamic, based on a FB input and the time and date.

The file will grow indefinitely, but Excel imposes a limit of 2^{20} rows, which is about 17 minutes at 1ms. Other text editors (Notepad++ possibly) may allow more.

Included is the one FB and a quickstart guide.

The library file (*.compiled-library) can be installed to the CODESYS software on your PC and the FB be accessed as any block, please follow guidelines and description.



5 Preparing your editor

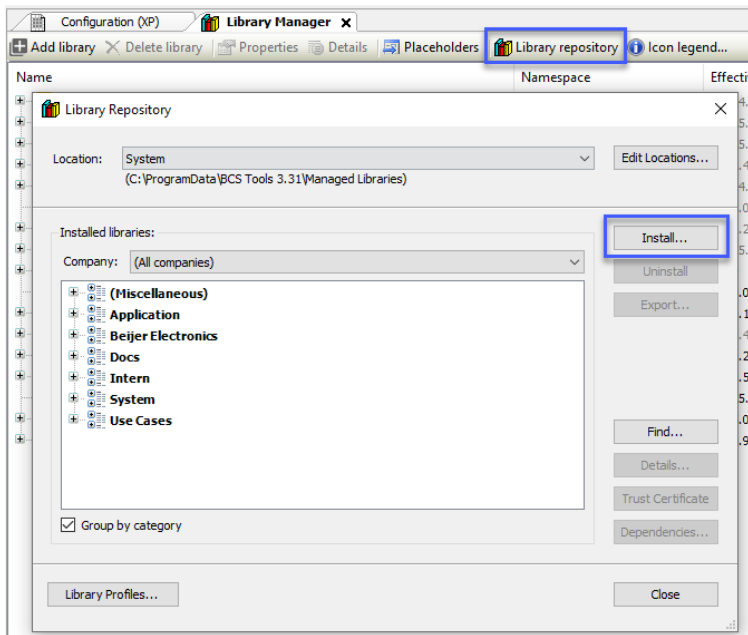
The following chapter describes important procedures and settings needed for a well functioning system.

5.1 Installation of the library to your editor

The *.compiled-library needs to be made available in your system so it can be included in projects. This is done by accessing the 'Library Manager' → 'Library Repository' then 'Install'.

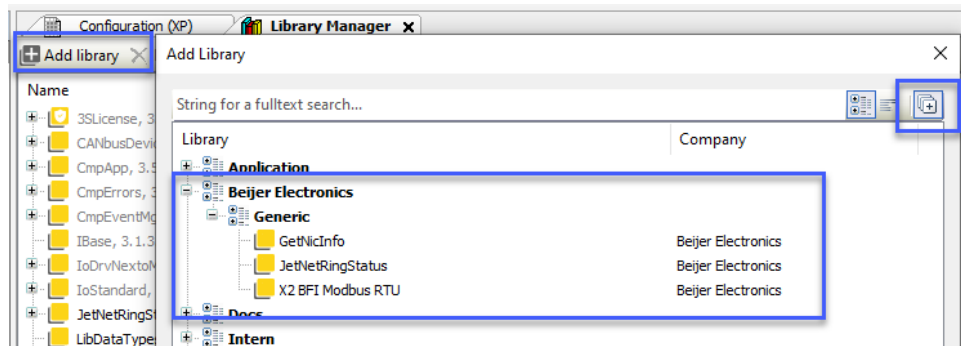
Navigate to the folder where you have put the *.compiled-library. This procedure will need to be repeated if you use a new PC.

Note, the location of System path may differ depending if using BCS Tools or CODESYS software tool and what version of the software.



5.2 Add the library into your project

The new library is now available for you to include in your specific project (example screenshot):



The selected library is now visible in the Library Manager. Its public objects and supplementary help is available here.

6 Description of function blocks

6.1 fbdLogger

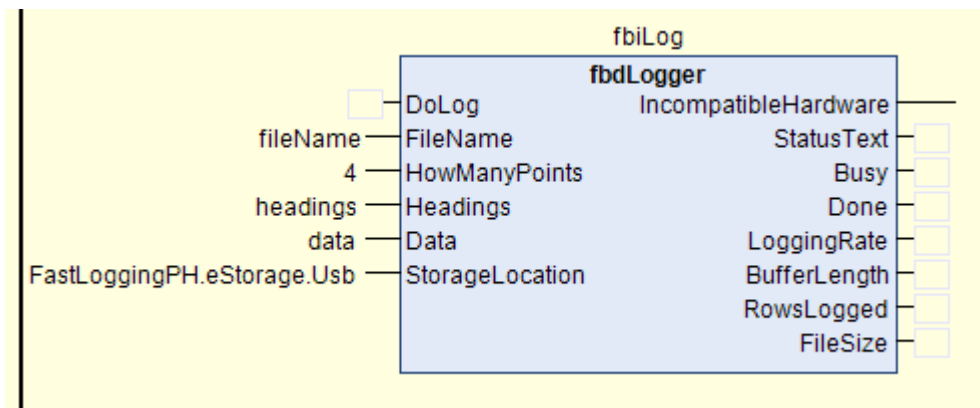
This FB provides a method to log PLC data to a csv file.

The FB can be used to log upto 10 REALs data signals at a rate of as low as 1ms.

The library creates a CSV file that can be written to USB, SD or internally (to the FTP area of the X2). The filename is dynamic, based on a FB input and the time and date.

The file will grow indefinitely, but Excel imposes a limit of 2^20 rows, which is about 17 minutes at 1ms. Other text editors (Notepad++ possibly) may allow more.

6.1.1 Provide an instance name for the FB and populate the inputs



6.1.2 fbdLogger arguments

Input	Type	Initial	Comment
DoLog	BOOL		The logger runs continuously whilst this flag is high
FileName	STRING	'Log'	The user-defined filename prefix
HowManyPoints	USINT	4	The quantity of points to log
Headings	ARRAY [0..9] OF STRING(20)		The user-defined csv file column headers
Data	ARRAY [0..9] OF REAL		The user's data
StorageLocation	eStorage	eStorage.Local	Select where the file is to be created

Output	Type	Initial	Comment
IncompatibleHardware	BOOL		Target is not an X2Control or BoX2Control device
StatusText	STRING		
Busy	BOOL		Indicate a successful completion i.e. the termination character has been received
Done	BOOL		True for one scan after file is closed
LoggingRate	STRING		Provides a text output with the current logging rate. Determined by the task time, but it is measured and that value is presented
BufferLength	INT		Used for diagnosis
RowsLogged	UDINT		Realtime tally of the number of rows logged
FileSize	UDINT		The size (in bytes) of the file being created

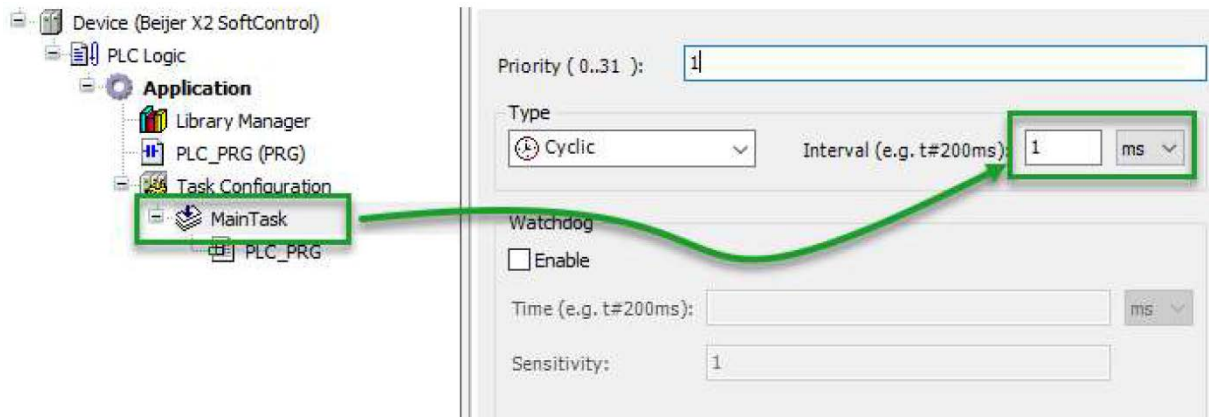
6.1.3 Populate the Headings and Data.

This shows the interaction between the Codesys program and the Csv file.

The screenshot illustrates the data flow between the Codesys program and a CSV file. In the Codesys environment, the 'Headings' array contains the strings 'Temperature', 'Flow', 'Pressure', and 'Force'. The 'Data' array contains numerical values: 1.1, 2.2, 3.3, 4.4, 5.5, 0, 0, 0. The CSV file, named 'Log2020_04_21', has columns A, B, C, and D corresponding to these headings. The data in the CSV file matches the values in the Codesys 'Data' array. A '1ms capture rate' is also indicated in the CSV file.

6.1.4 Determine logging rate

Determining the logging rate is done by changing the TaskTime where the FB is hosted.



6.1.5 Starting logging.

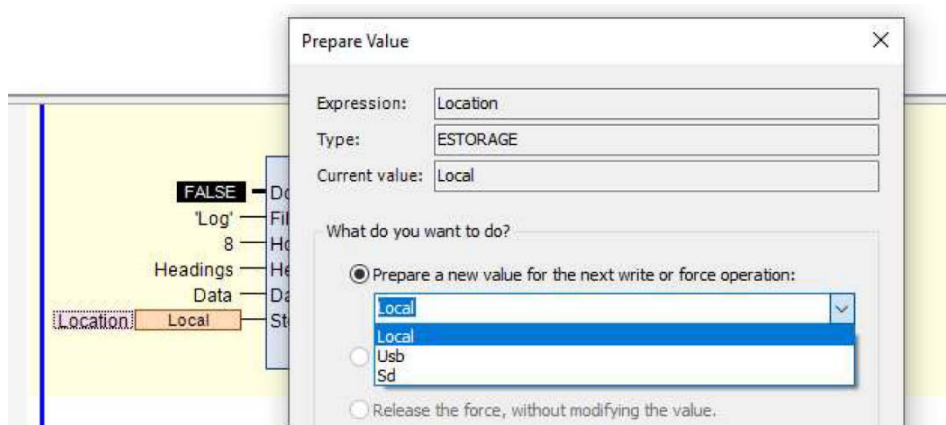
The logging operation is carried out for as long as the DoLog FB input is high.

A new file is created each time with the filename being determined by

- The string value in FB input FileName +
- yyyy_mm_dd +
- hh_mm_ss +
- .CSV

6.1.6 File location.

The user can choose 1 of 3 locations to store the file. The choice is made with the FB input **StorageLocation** which is an ENUM: NB the Usb and SD target need a **\Log** folder creating beforehand. The **Local** choice puts the resulting file in the FTP-accessible area of the X2. External memory cards' quality varies. Using slow Usb's or Sd cards will cause a buffer overflow (handled exception).



6.1.7 Status.

The FB gives the user its status by:

- 1) Flag status
 - a) **Busy** – true whilst creating the file, collecting data and closing the file;
 - b) **Done** – true for one-scan when file is closed.
- 2) Plain text. See table:

Text	Description
Idle	Waiting for a request to start
Confirming target directory exists	The block is checking that the target medium is present (and has a \Log folder)
Getting Date	Retrieving the OS time and date to form part of the log's filename
Opening file	Creating the new *.csv file
Writing headings	Writing the column headers to the file
Collecting data	Collecting data
Closing file	After logging has finished, the file is closed
Could not create file. Check filename is valid	Usual filename rules are obeyed
Number of point must be greater than zero	Check the block's input parameters
Number of points must be 10 or less	Check the block's input parameters
Could not write new line	USB (typically) is too slow. USB/SD removed midway through logging Memory full
Buffer overrun	USB (typically) is too slow.
External memory needs a "\Log" folder and internal needs "Project Files" folder	The target medium need the appropriate sub-folder creating
Attempting to close	Following an error, the block will try to gracefully close the file

- 3) Number of rows logged. Incremented for each row of data logged.
- 4) FileSize. Presents the real-time size of the file in bytes

6.1.8 Size limitations

Text files have a limit of 1048576 rows, therefore, at 1ms logging interval the file can store just over 17minutes worth of data, however the quantity of files to be stored is limited only by the target's memory.

6.1.9 Performance limitations

The logged data is buffered and written to the medium (USB, SD or locally) in lumps to minimise the amount of writes.

There is still a requirement that the medium is fast enough be written to as this buffered speed and with sometimes large amounts of data.

1ms logging is possible with USB memory with write speeds greater than 12MB/s (measured)

Tools are available to take real-world USB performance figures. SD cards are inherently faster, any card from a reputable manufacturer will be ok.

Note!

Recommendation to use SD card instead of the built-in flash memory when extensive data logging is performed. Read more about the X2 and iX Developer 2.40 - Flash memory best practice: [click here](#)

"...iX Developer 2.40 SP5 introduces the capability to use external SDcard on X2 devices with SD card support. An SD card is easy to replace compared to a built-in memory. Beijer Electronics AB recommends you to use SD card instead of the built-in flash memory when extensive data logging is performed. Scripting towards the database can cause an increase inwrite and affect the general sustainability and performance of the database..."

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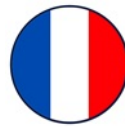
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